$$P = [p_1, p_2, \ldots, p_n]$$

$$T(x) = tanh(x)$$

$$L(x, m, h) = m + \frac{x+1}{2} \cdot (h - m)$$

$$S(n) = \frac{1}{n}$$

$$I(x, n) = \frac{T(x)}{S(n)}$$

$$R(x, n) = \frac{(T(x) - I(x, n) * S(n))}{S(n)}$$

$$A(x, P) = L(R(x, n), P[I(x, n)], P[I(x, n) + 1])$$

Derivatives:

$$\frac{\partial T(x)}{\partial x} = (1 - tanh(x)^2)$$

$$\frac{\partial L(x, m, h)}{\partial x} = \frac{h - m}{2}$$

$$\frac{\partial L(x, m, h)}{\partial m} = -\frac{x - 1}{2}$$

$$\frac{\partial L(x, m, h)}{\partial h} = \frac{x + 1}{2}$$

$$\frac{\partial S(n)}{\partial n} = -\frac{1}{n^2}$$

$$\frac{\partial I(x, n)}{\partial x} = \frac{\frac{\partial T(x)}{\partial x}}{S(n)}$$

$$\frac{\partial I(x, n)}{\partial n} = -\frac{T(x)}{n^2}$$

$$\frac{\partial R(x, n)}{\partial x} = \frac{\frac{\partial T(x)}{\partial x}}{S(n)} - \frac{\frac{\partial I(x,n)}{\partial x} S(n) + I(x, n) \frac{\partial S(n)}{\partial n}}{S(n)^2}$$

$$\frac{\partial R(x, n)}{\partial n} = -\frac{T(x)}{n^2} - \frac{\frac{\partial I(x,n)}{\partial n} S(n) + I(x, n) \frac{\partial S(n)}{\partial n}}{S(n)^2}$$

apply chain rule:

$$\frac{\partial A(x, P)}{\partial x} = \frac{\partial L(R(x, n), P[I(x, n)], P[I(x, n) + 1])}{\partial x} \cdot \frac{\partial R(x, n)}{\partial x}$$

$$\frac{\partial A(x, P)}{\partial P[I(x, n)]} = \frac{\partial L(R(x, n), P[I(x, n)], P[I(x, n) + 1])}{\partial m} \cdot \frac{\partial R(x, n)}{\partial x}$$
$$+ \frac{\partial L(R(x, n), P[I(x, n)], P[I(x, n) + 1])}{\partial h} \cdot \frac{\partial R(x, n)}{\partial x}$$